

# Open data for climate impact modeling in Poland: geoportal ClimateImpact.sggw.pl



Ignacy Kardel,  
Mikołaj Piniewski,  
Marcin Brach

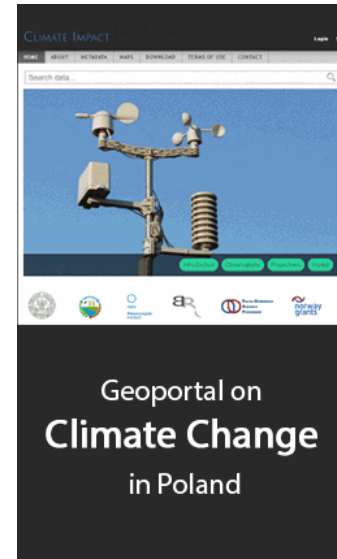
Warsaw University of Life Sciences – SGGW

## The goal of the Geoportal:

- Spatial, interactive visualization of observed and projected climate change and its impacts in selected sectors
- Promotion and dissemination of results of CHASE-PL project
- Providing data for science and education

## Potential users:

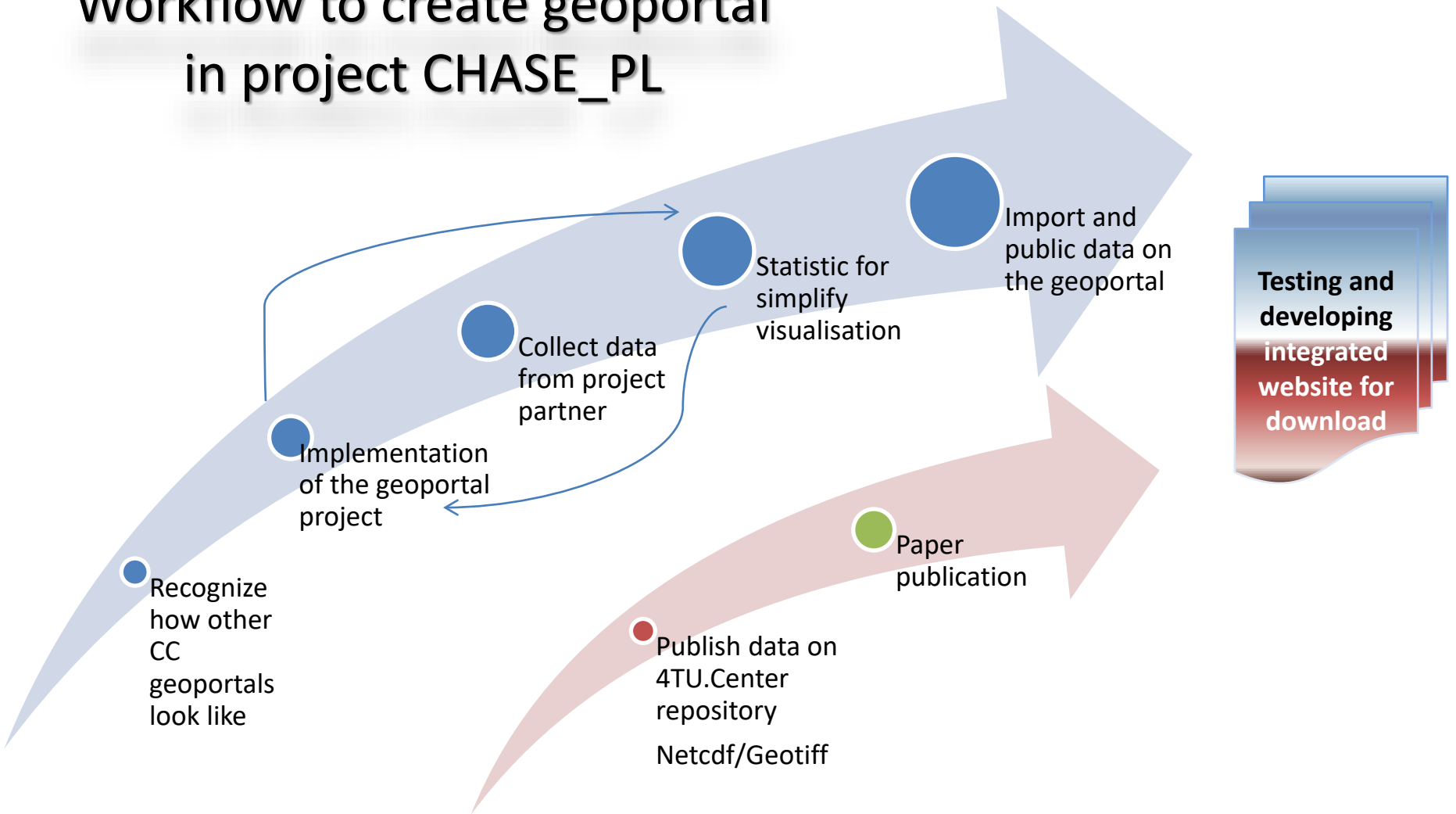
- Scientists
- Students
- High school students
- Media
- Public administration
- ???



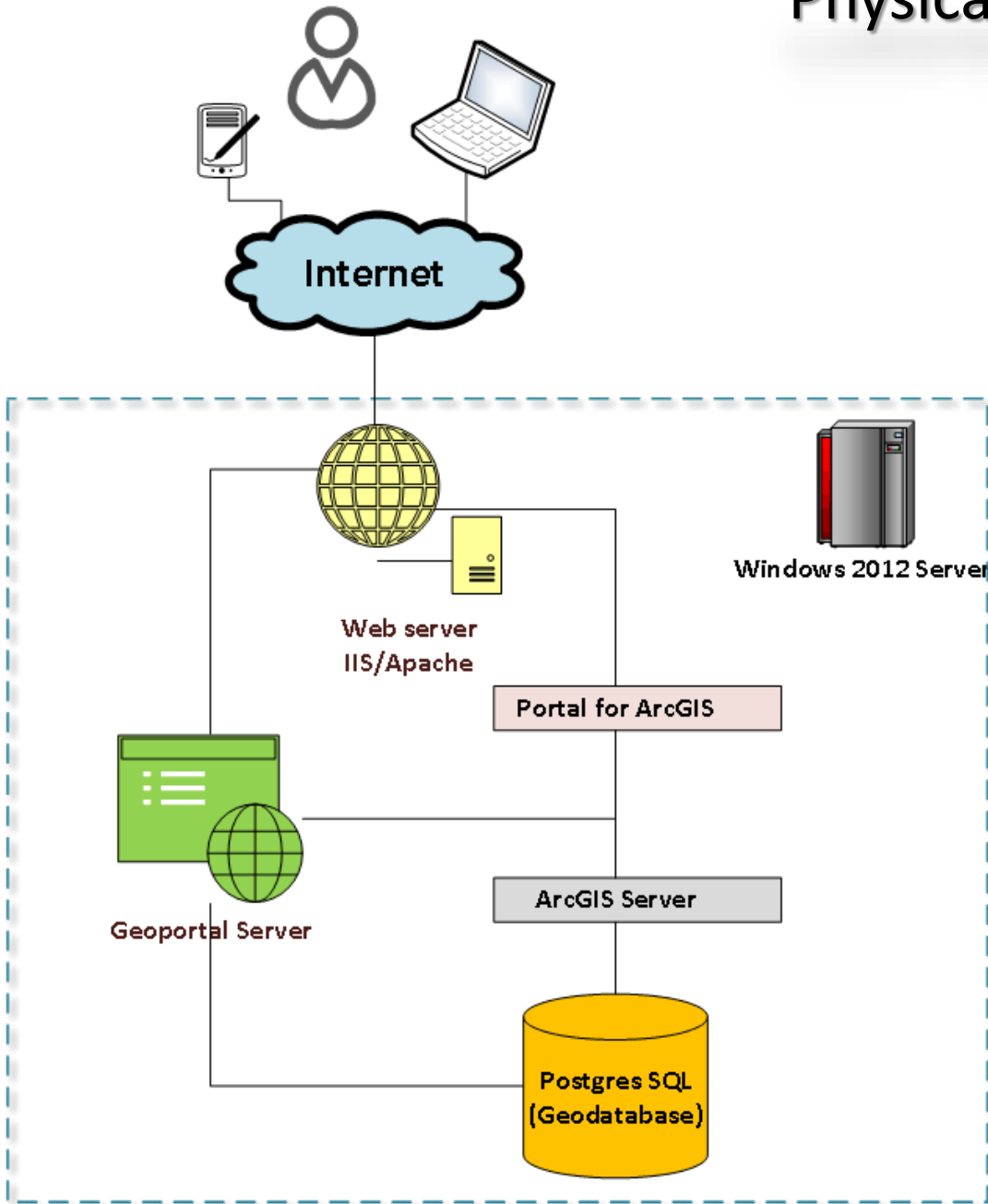
# Contents

- Workflow
- Structure
- Functionality
- How to develop input (scientific basis)
- Presentation of the site
- Data download

# Workflow to create geoportal in project CHASE\_PL



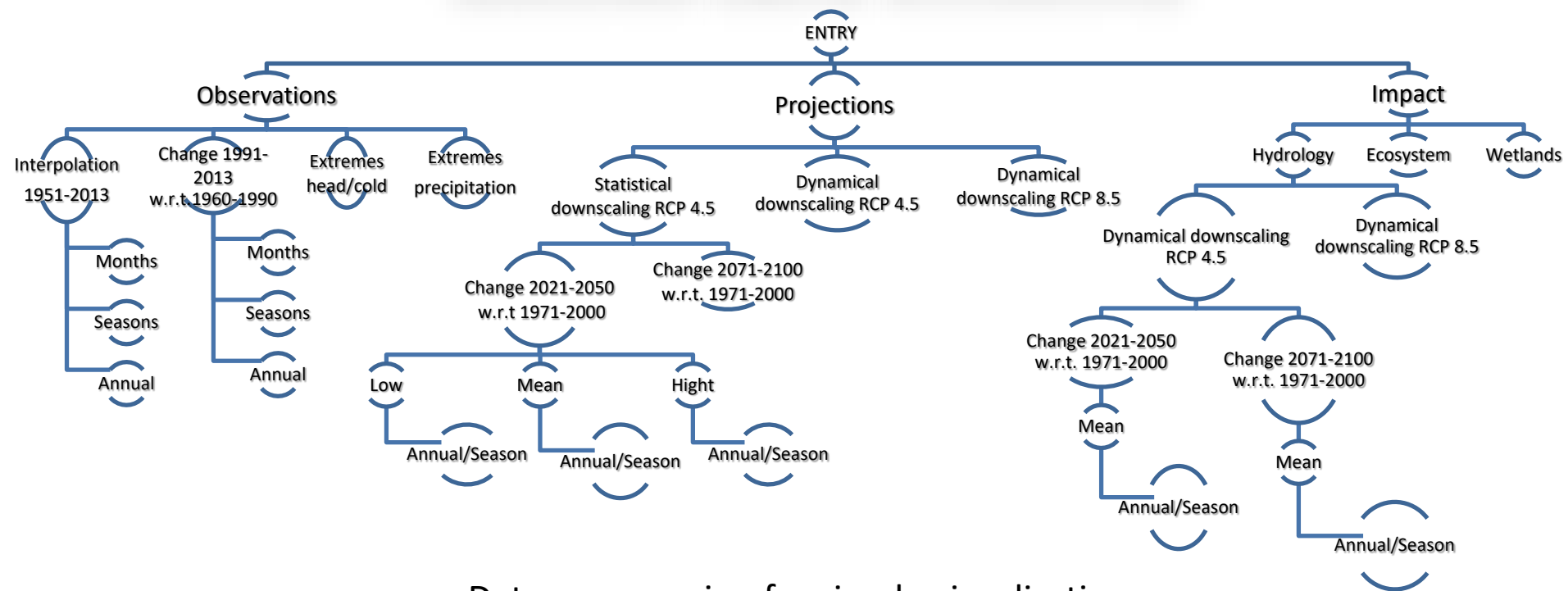
# Physical architecture of the geoportal



## Components:

- Virtual machine running on Windows Server 2012
- Esri Geoportal Server 1.2.6
- ArcGIS Server 10.3
- Apache Web Server
- Portal for ArcGIS
- Webmap App base on JavaScript frameworks
- Postgres SQL

# Webmaps logical architecture



## Data compression for simple visualization

Rasters/points maps

Rasters/points maps

Poligons/line attributes

Input: 69 000

7 mln

613 000

Output: 3 100

150

280

# Data sources

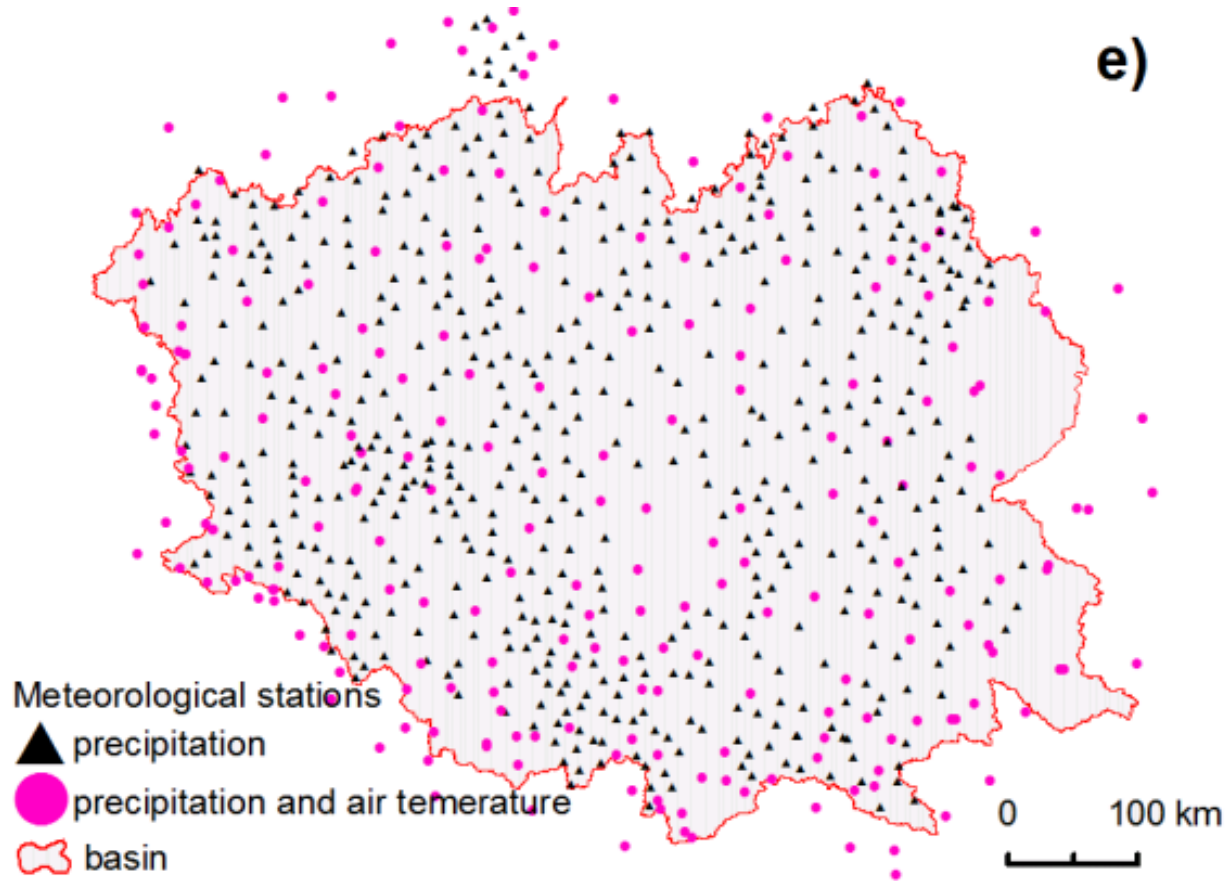
From CHASE-PL project: Climate change impact assessment for selected sectors in Poland

<http://www.chase-pl.pl>

Developed by the following partners:

- Polish Academy of Sciences in Poznań
- Warsaw University of Life Sciences - SGGW
- MET Norway (Oslo)

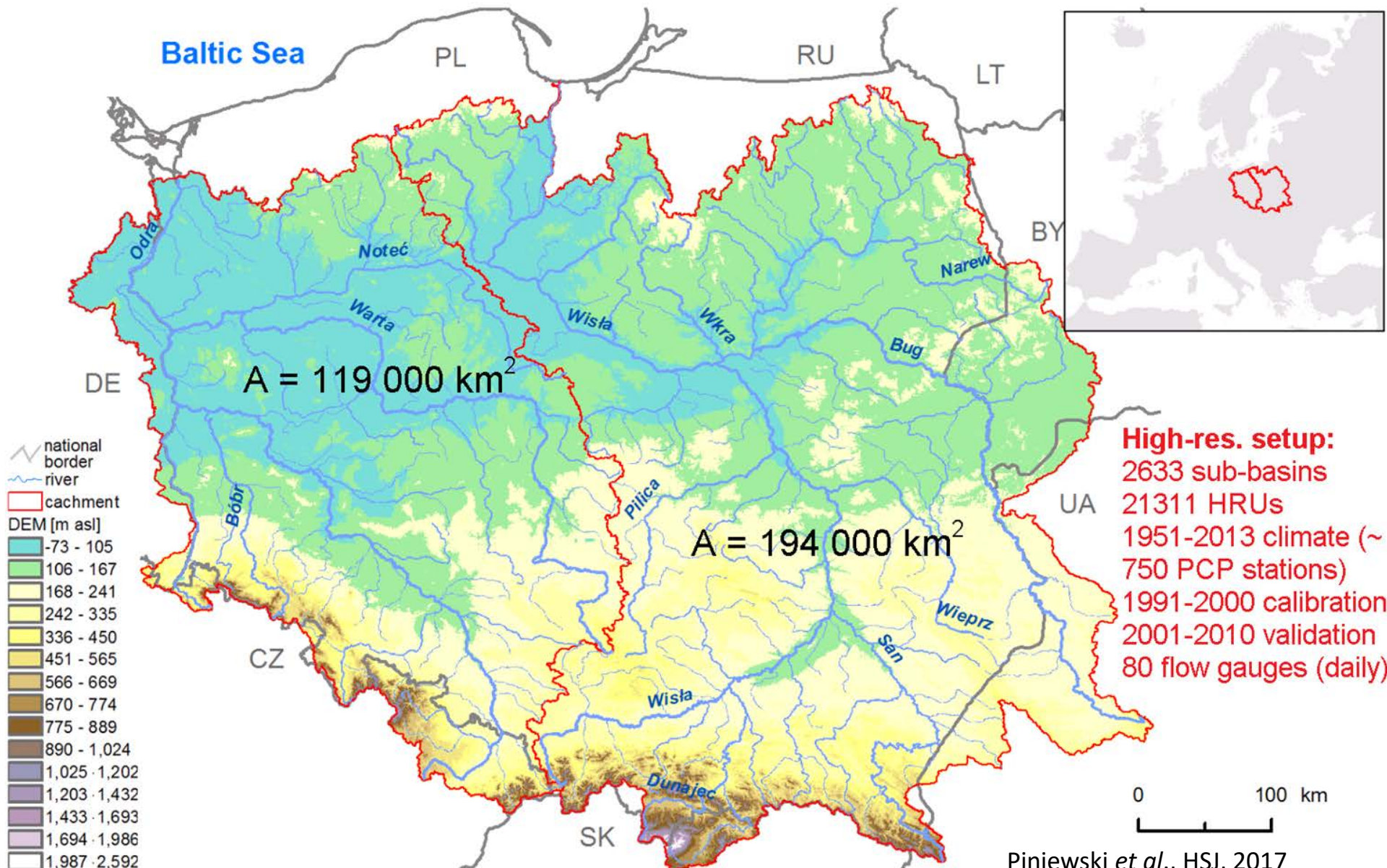
# Climatic **OBSERVATION** come from Institute of Meteorology and Water Management



- A 5-km daily grid of temperature and rainfall data (CPLFD-GDPT5) has been developed and released.



# Hydrological SIMULATIONS were developed using SWAT



# Climate change projections

- Bias-corrected RCM climate projections
  - 9 climate model simulations
  - 2 RCPs: 4.5 and 8.5
  - Reference period 1971-2000, 2 future horizons 2021-2050 (near future, **NF**), 2071-2100 (far future, **FF**)

---

N	Global Climate Model			Regional Climate Model	
	Institute	Model	Run	Institute	Model
1	CNRM-CERFACS	CNRM-CM5	r1i1p1	CLMcom	CCLM4-8-17
2	CNRM-CERFACS	CNRM-CM5	r1i1p1	SMHI	RCA4
3	ICHEC	EC-EARTH	r12i1p1	CLMcom	CCLM4-8-17
4	ICHEC	EC-EARTH	r12i1p1	SMHI	RCA4
5	ICHEC	EC-EARTH	r1i1p1	KNMI	RACMO22E
6	ICHEC	EC-EARTH	r3i1p1	DMI	HIRHAM5
7	IPSL	IPSL-CM5A-MR	r1i1p1	SMHI	RCA4
8	MPI-M	MPI-ESM-LR	r1i1p1	CLMcom	CCLM4-8-17
9	MPI-M	MPI-ESM-LR	r1i1p1	SMHI	RCA4

---

# Functionalities

- Search for data in metadata service
- Downloading source data (source)
- Two languages versions - Polish and English
- Identification of values on the map
- The ability to compose two maps
- Transparency control
- Color scale control (vector layers)
- Search by towns



# Presentation of the service

<http://climateimpact.sggw.pl>

CLIMATE IMPACT

Login

START O NAS METADANE MAPY **POBIERZ** WARUNKI UŻYTKOWANIA KONTAKT

## Do pobrania

### LINKI DO REPOZYTORIUM DANYCH OPRACOWANYCH W PROJEKCIE

Mapy rastrowe dobowej temperatury powietrza i sumy opadów dla wielolecia 1951-2013 dla obszaru Polski o rozdzielczości 5x5km

1. Dataset: *CHASE-PL Forcing Data – Gridded Daily Precipitation and Temperature Dataset 5 km (CPLFD-GDPT5)*
2. Article: *Berezowski, T.; Szcześniak, M.; Kardel, I.; Michałowski, R.; Okruszko, T.; Mezghani, A. and Piniewski, M.: CPLFD-GDPT5: high-resolution gridded daily precipitation and temperature data set for two largest Polish river basins, Earth Syst. Sci. Data, 8, 127-139, 2016, doi:10.5194/essd-8-127-2016*

Dobowy, naturalny przepływ rzeczny i miesięczne składowe bilansu wodnego uzyskane z symulacji modelu SWAT dla dorzeczy Wisły i Odry, za okres 1954-2013

1. Dataset: *Piniewski, M., M. Szcześniak, I. Kardel, and T. Berezowski (2015), CHASE-PL Natural Hydrology dataset (CPL-NH), Dataset on 3TU.Datacentrum, doi: 10.4121/uuid:b8ab4f5f-f692-4c93-a910-2947aea28f42*
2. Artykuł złożony do recenzji: *Piniewski, M., Szcześniak, M., Kardel, I., Berezowski, T., Okruszko, T., Srinivasan, R., Schuler, D., V., Kundzewicz, Z., W., 2016. Modelling water balance and streamflow at high resolution in the Vistula and Oder basins. Hydrological Sciences Journal.*





# Observations

The screenshot shows the 'Climate change observations' web application. The interface includes a top navigation bar with the logo and links like 'ChasePL', 'Norway Grants', 'NCBiR', and 'Main page'. A search bar at the top left contains 'Esri World Geocoder'. The main area is a map of Central Europe showing a temperature difference raster. A legend on the left indicates a color scale from -0.5 (blue) to 15 (red) degrees Celsius. A sidebar on the left allows switching between 'Temperature', 'Precipitation', and 'Extremes', and selecting time periods like 'Monthly', 'Seasonal', and 'Annual'. A bottom timeline shows years from 1951 to 2013. A 'Confirm' button is at the bottom right.

**Switch to temperature / precipitation / extremes**

**Search city**

**Zoom in / Zoom out**

**Click for identification**

**Switch compositions**

**Make raster visible**

**Run animation**

**Manual slider for a month/season/year**

**Type a month/season/year & Confirm**

# Observations exstreme

**Climate change observations**

ChasePL Norway Grants NCBIR Main page

Esri World Geocoder

Number of hot/ice days

Number of very cold days in a year (Tmin < -10°C) [d]

Fields: Number of very cold days in a year (Tr)

Colormap theme: Extremes

0

-3

-4

-5

-8.3

Slupsk

Lebork

Gdynia

Gdansk

WOJ. POMORSKIE

Koszalin

Koscierzyna

Tczew

Starogard Gdanski

Szczecinek

Czarne

Chojnice

Kwidzyn

Ostroda

Ilawa

Grudziadz

Bydgoszcz

Torun

40km

53.825 19.942 Degrees

Observations

Projections

Impact

Visibility

No legend

Esri, HERE, DeLorme, NGA, USGS | Esri, HERE

POWERED BY esri

**Make points visible**

**Switch characteristics**

**Switch type of symbols**

**Set ranges for scale**

**Make last raster visible**

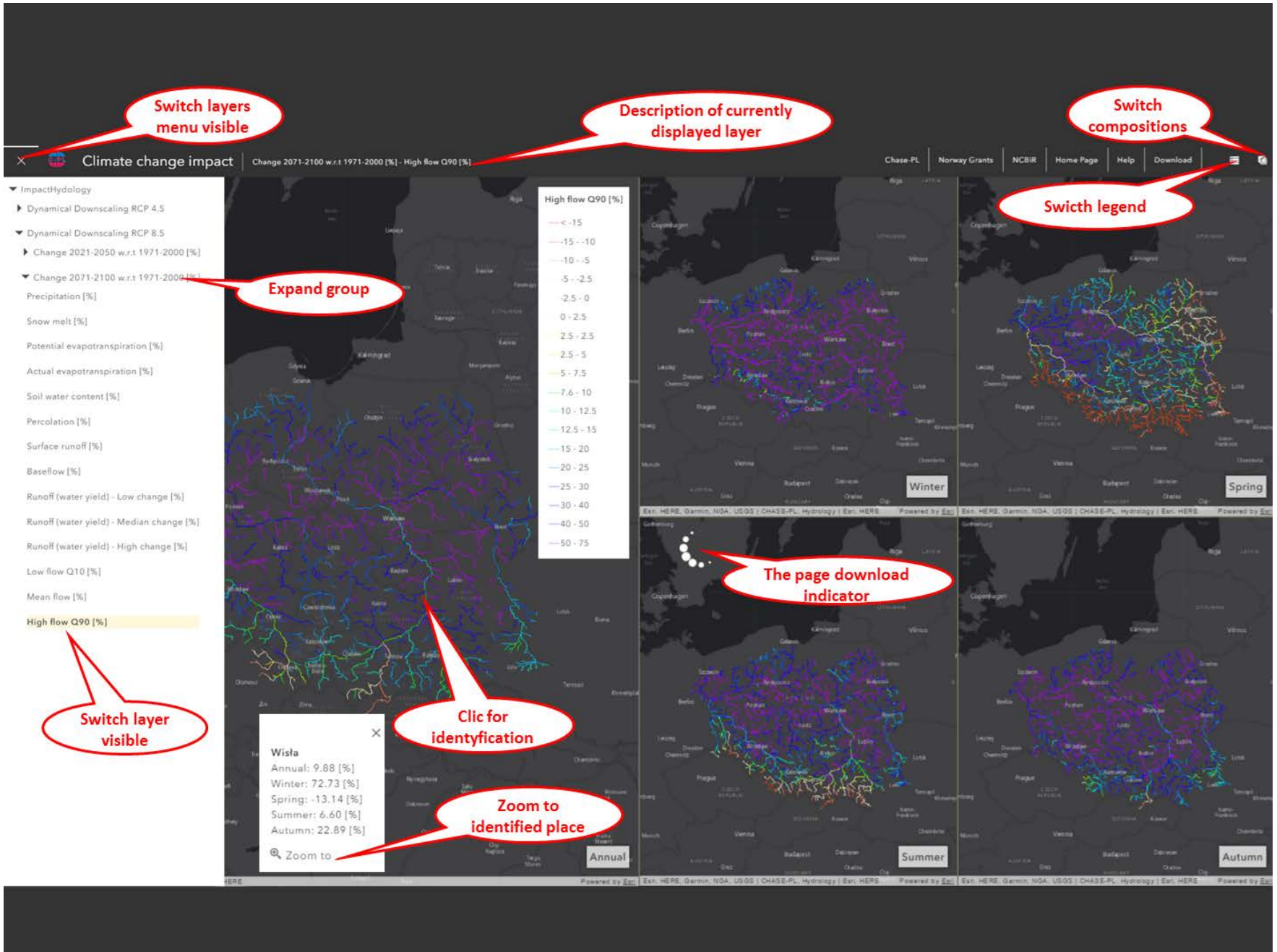
**A place where the calculated characteristics**

# Projections





# Impact





# Download

## Open-access CHASE-PL datasets for researchers

- Available at 4TU Centre for Research Data (online repository)  
<http://researchdata.4tu.nl/> (or Google search: CHASE-PL data)

4TU.Centre for Research Data

[Twitter](#) | [RSS](#) | [Contact](#) | [Terms of use](#) | [Login](#)

Collection : **CHASE-PL: Climate change impact assessment for selected sectors in Poland.**

[+ show all collections](#)

[All collections](#)

[Datasets of projects](#) [\[Search in this collection\]](#)

CHASE-PL: Climate change impact assessment for selected sectors in Poland.

title	?	CHASE-PL: Climate change impact assessment for selected sectors in Poland.
creator	?	Institute for Agricultural and Forest Environment (IAFE), Polish Academy of Sciences
creator	?	Norwegian Meteorological Institute (MET Norway)
creator	?	Warsaw University of Life Sciences – SGGW, Faculty of Civil and Environmental Engineering
description	?	The CHASE-PL project will contribute to improvement of understanding of climate change in Poland and its impacts in selected sectors in the country. The project will extend in numerous ways the state-of-the-art of the detection of change, projection of climate change and its impacts on water management, ecosystems and biodiversity, agriculture and food production.
subject	?	climate • climate change • Poland
▲ in collection	?	<a href="#">Datasets of projects</a>
related publication	?	<a href="http://www.chase-pl.pl">www.chase-pl.pl</a>
▼ contains	?	<a href="#">CHASE-PL - Future Hydrology (CPL-FH)</a>
▼ contains	?	<a href="#">CHASE-PL Climate Projections: 5-km Gridded Daily Precipitation &amp; Temperature Dataset (CPLCP-GDPT5)</a>
▼ contains	?	<a href="#">CHASE-PL Forcing Data: Gridded Daily Precipitation &amp; Temperature Dataset 5 km (CPLFD-GDPT5)</a>
▼ contains	?	<a href="#">CHASE-PL – Natural Hydrology dataset (CPL-NH)</a>
▼ contains	?	<a href="#">Natural Flow Regimes in Poland (NFRPL)</a>

<< more info...

Home

Upload datasets

Personal page

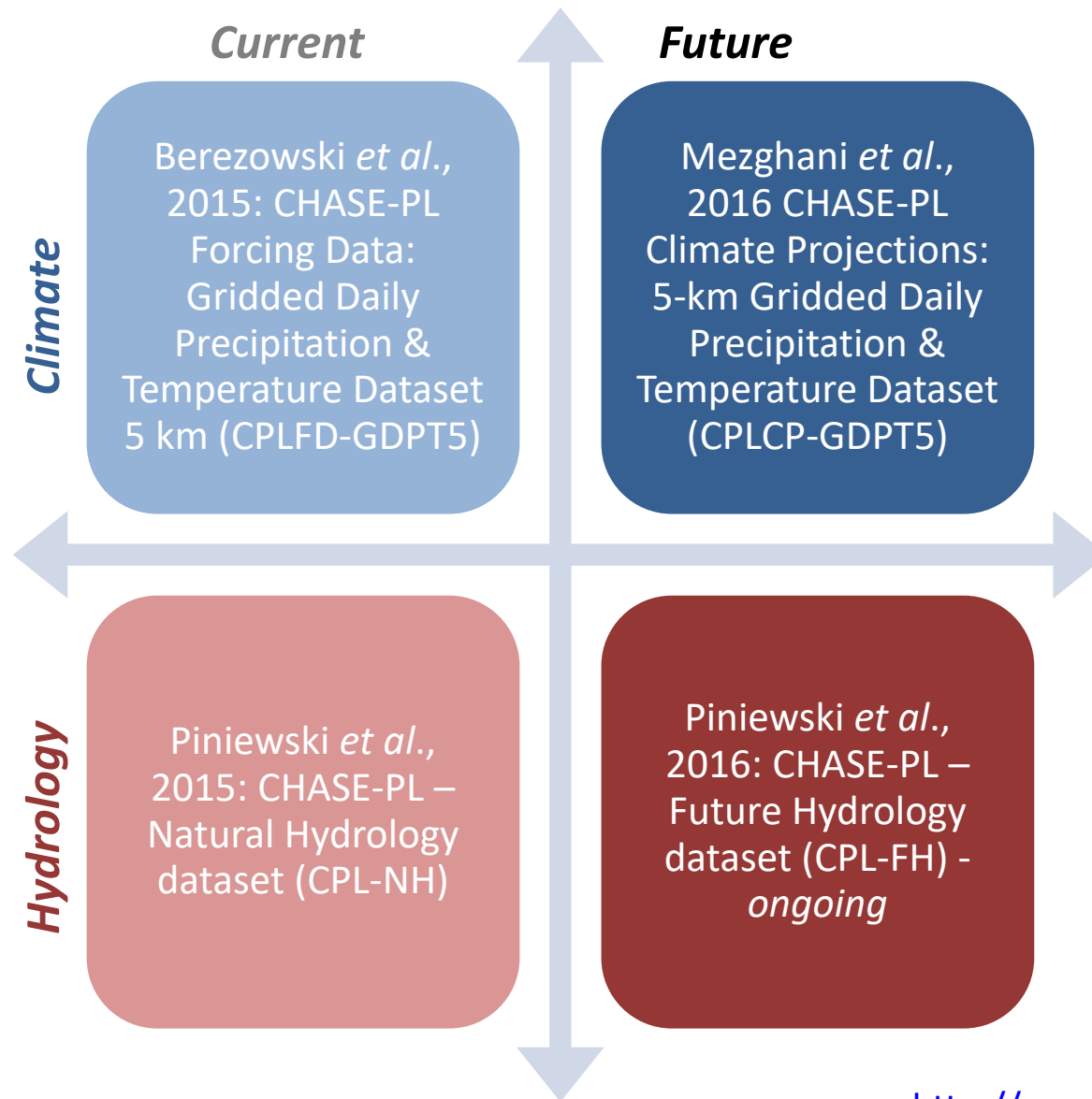


» Search in Data

» Search in "Info"

- Why repository?
  - Best means of making data discoverable, reproducible, citable and reusable for general public (open access)
  - Long-lasting archiving with persistent DOI
  - Emergence of data journals

# Available CHASE-PL datasets



# How to download part of data using OPeNDAP services

**prAdjust: Grid**

time: 0:1:9    y: 110:1:110    x: 123:1:123

standard\_name: precipitation\_flux  
units: kg m<sup>-2</sup> s<sup>-1</sup>  
coordinates: lon lat  
\_FillValue: 1.0E20  
missing\_value: 1.0E20

**X: Array of 64 bit Reals [x = 0..167]**

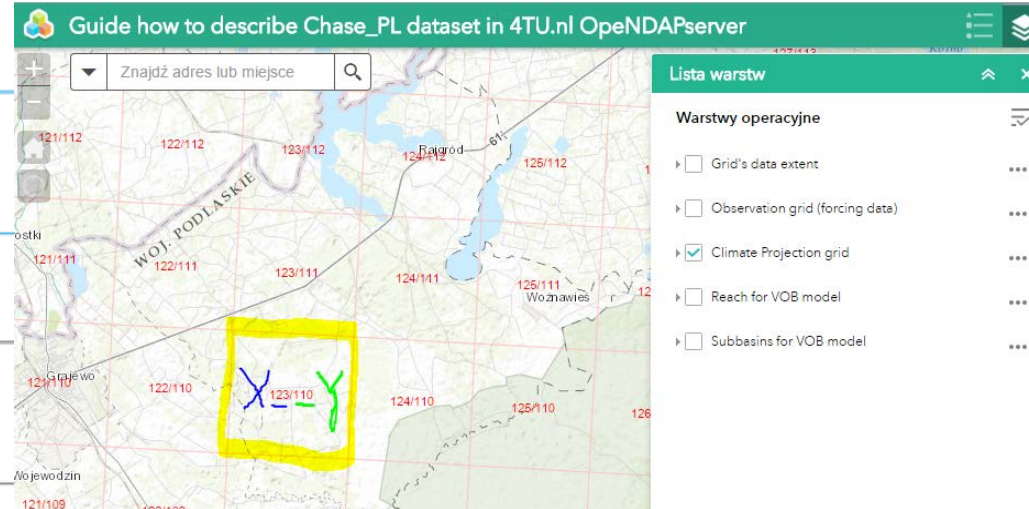
x: 123:1:123

units: m  
long\_name: original coordinates

**Y: Array of 64 bit Reals [y = 0..136]**

y: 110:1:110

units: m  
long\_name: original coordinates



```
Dataset {  
  Grid  
  ARRAY:  
    Float32 prAdjust[time = 10][y = 1][x = 1];  
  MAPS:  
    Float64 time[time = 10];  
    Float64 y[y = 1];  
    Float64 x[x = 1];  
  } prAdjust;  
  Float64 x[x = 1];  
  Float64 y[y = 1];  
} data2/uuid/e940e1a-71a0-449e-bbe3-29217f2ba31d/prAdjust_POL-05_CNRIH-CERFACS-CNRIH-OMS_historical_rliip1_CLJcom-CCUM-8-17_v1-  
METHOD-OMAP-ChasePObs-1951-2013_day_19710101-20001231.nc;
```

metadane zbioru danych

```
prAdjust.prAdjust[10][1][1]  
[0][0], 3.9321472E-5  
[1][0], 6.7121184E-9  
[2][0], 2.9387924E-5  
[3][0], 2.577777E-5  
[4][0], 2.548855E-5  
[5][0], 0.0  
[6][0], 7.158276E-6  
[7][0], 0.0  
[8][0], 0.0  
[9][0], 4.6625414E-7
```

wartości zmiennej prAdjust -  
wysokości opadu

```
prAdjust.time[10]  
7701.5, 7702.5, 7703.5, 7704.5, 7705.5, 7706.5, 7707.5, 7708.5, 7709.5, 7710.5
```

wartości zmiennej czasowej

```
prAdjust.y[1]  
647983.596068874  
prAdjust.x[1]  
738381.296218639
```

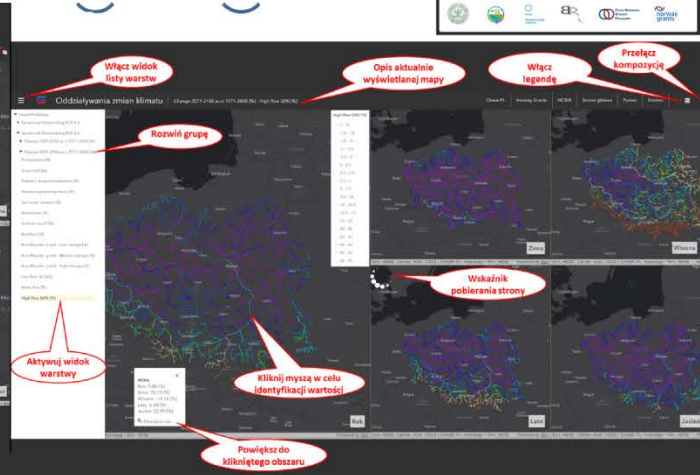
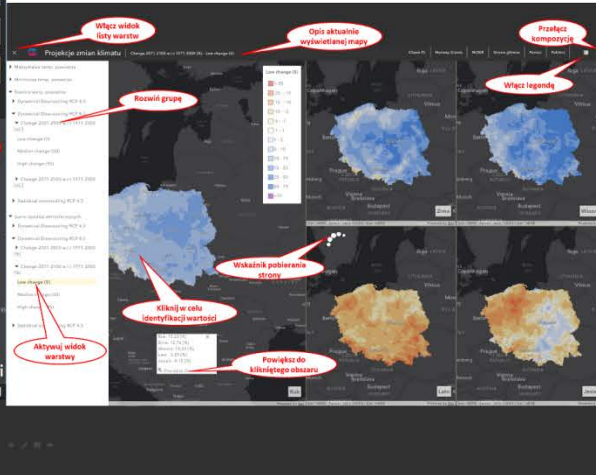
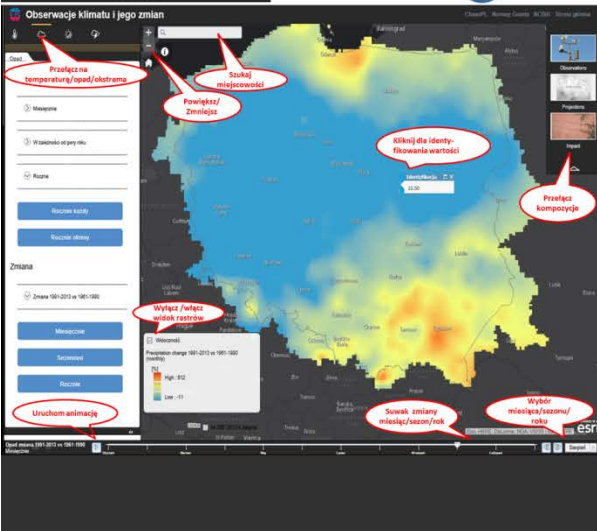
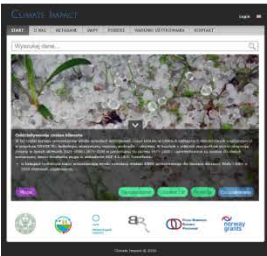
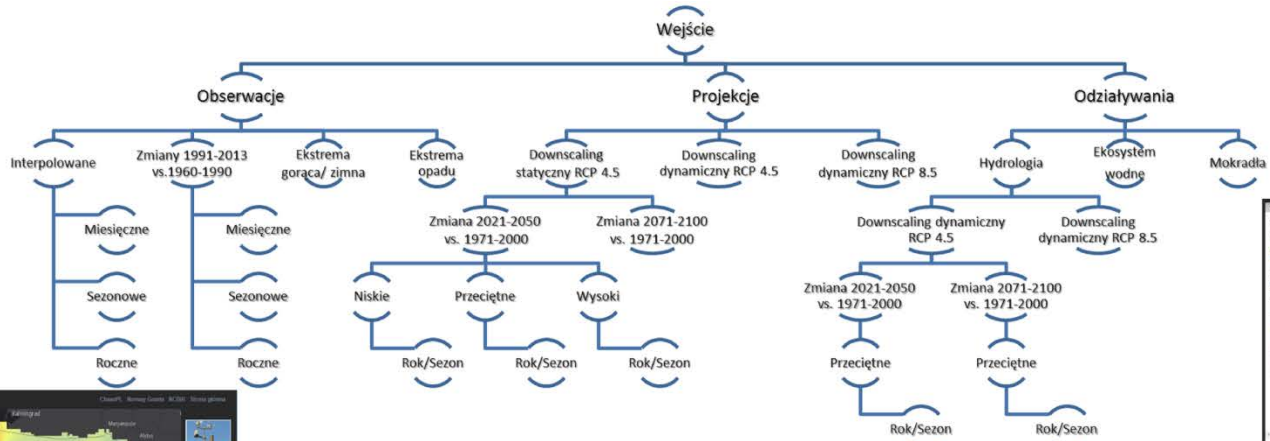
Współrzędne wybranego  
oczka siatki

```
x[1]  
738381.296218639  
y[1]  
647983.596068874
```

# How sciences can use the geoportal

1. [Quick description of meteorological and hydrological conditions \(current and future\) using the IDENTIFY tool](#)
2. [Download daily data \(63 years\) and conduct your own statistical analyzes for any area in Poland](#)

# Thank you for your attention





# Organization of WebMap



Main page			Sub pages/Menu	Time	Area
Long name	Short name ENG	Short name PL			
1. Observed Climate Change in Poland (1951-2013)	Observations (1951-2013)	Obserwacje (1951-2013)	Temperature, Precipitation, Hot & Cold Days, Vegetation, Extreme events	Year Season Avg for many years	Poland Catchment
2. Projected Climate Change for Poland (2021-2050)	RCM projections (2021-2050)	Projekcje modeli RCM (2021-2050)			
3. Projected Climate Change for Poland (2071-2100)	RCM projections (2071-2100)	Projekcje modeli RCM (2071-2100)			
4. Model-based assessment of climate change impacts in the Vistula and Odra basins	Hydrology: simulations and impacts	Hydrologia: symulacje i oddziaływania	Change between base & CC scenarios: <ul style="list-style-type: none"> <li>- Runoff</li> <li>- Outflow units</li> <li>- Yields for selected crops?</li> <li>- Biomass growth?</li> </ul>	Year Season Avg for many years	Oder & Vistula Catchment